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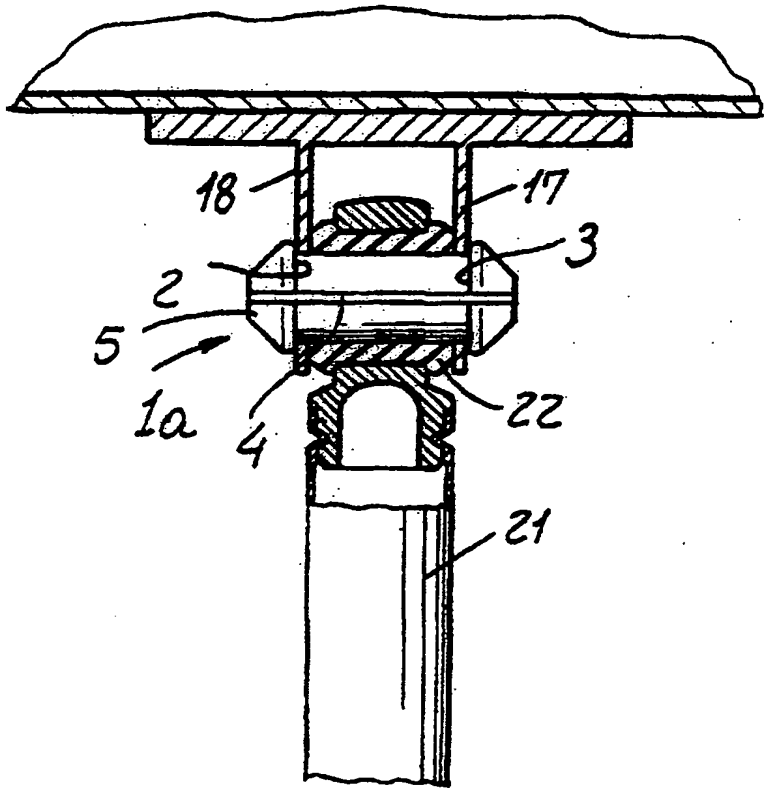
(54) Title: DEVICE FOR ANCHORING THE BASKET DAMPER IN A WASHING MACHINE OR THE LIKE

(57) Abstract

The present invention relates to a device for anchoring the basket damper in a washing machine or the like. This device comprises a resilient pin (1a–e), having a cylindrical hollow body, of circular cross section, which is provided, on the outer side surface thereof, with two axially spaced shoulders (5, 6). The hollow body comprises at least an axial slit (4, 12, 13) for allowing the body to be resiliently compressed; at least one of the two shoulders is coupled to the nearest axial end of the body by a conical surface portion defining a pin receiving end portion.



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Description

DEVICE FOR ANCHORING THE BASKET DAMPER IN A WASHING MACHINE OR THE LIKE

Background of the Invention

The present invention relates to a device for anchoring the basket damper in washing machines or the like.

As is known, the linen basket of conventional washing machines is suspended, at a top portion thereof, to the bearing framework of the washing machine by a pair of springs and, at a bottom portion thereof, it is anchored or latched to the washing machine bearing framework by a pair of dampers.

The anchoring or latching of each damper to the basket is conventionally performed by a bolt, which is engaged in a throughgoing hole defined in a pair of ears of a bracket, which is fixed to the basket.

For latching purposes, a perforated end portion of the damper is engaged between the ears of the mentioned ear pair, by arranging the end hole of the damper aligned with the holes of the ear pair and, through the mentioned holes, being engaged and clamped the coupling bolt.

About the coupling bolt, between the mentioned pair of ears, is conventionally arranged a rigid spacing bushing and, between the latter and the end hole of the damper, a resilient spacer bushing is provided.

This anchoring system is very reliable and efficient, but it is unnecessarily sized with respect to the occurring loads.

Moreover, the above disclosed system is very expensive and the making method therefor requires a lot of operating steps.

A further alternating solution for anchoring the mentioned dampers to the washing machine baskets, is that of using a resilient pin, made of a plastic material, and provided for replacing the connecting bolt.

This system provides the advantages of a small cost and a quicker assembling method.

However, the plastic material resilient pin provides a small outwardly directed radial load on the inner surface of the hole receiving said resilient pin, as well as a practically zero cross load, since the tooth element usually included in the mentioned pin, at an axial end portion thereof, is exclusively used for anti-disengaging purposes.

The above mentioned tooth element, because of its construction, can not provide sufficient axial forces to cross press the anchoring system so as to overcome possible clearances due to inevitable making tolerances and for increasing the stiffness required for limiting possible unbalancings of the swinging assembly comprising the linen basket as well as the related coupling elements for coupling said basket to the washing machine framework.

Summary of the Invention

Thus, the aim of the present invention is to overcome the above mentioned problems, by providing a device for anchoring or latching the washing machine basket dampers, specifically designed for assuring a very high radial load as well as a high modulable cross

load.

Within the scope of the above mentioned aim, a main object of the present invention is to provide such a device which is very reliable in operation and has a long duration.

Another object of the present invention is to provide such a device which can be quickly assembled.

Yet another object of the present invention is to provide such a device which can be made at a very competitive cost.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by an anchoring device for anchoring the basket damper in washing machines and the like, characterized in that said anchoring device comprises a resilient pin, having a circular cross-section cylindric hollow body, provided, on an outer side surface thereof, with two shoulders which are axially spaced from one another.

Said body is provided with at least an axial slit for allowing said body to be radially compressed.

At least one of the mentioned two shoulders is coupled to the nearer axial end portion of said body, by a conical surface portion defining an end portion for engaging therein said body.

Brief Description of the Drawings

Further characteristics and advantages of the anchoring device according to the present invention will become more apparent hereinafter from the following disclosure of some preferred, though not exclusive, embodiments of said device, which are

illustrated, by way of an indicative, but not limitative, example, with reference to the accompanying drawings, where:

Figure 1 is a schematic view illustrating a linen washing machine;

Figure 2 is a perspective view illustrating the resilient pin, according to a first embodiment thereof;

Figure 3 illustrates the resilient pin of Figure 2, by a side elevation view;

Figure 4 is a further side elevation view illustrating a second embodiment of the resilient pin;

Figure 5 is a further side elevation view illustrating a third embodiment of the mentioned resilient pin;

Figures 6 and 7 are respective partially cross-sectional side elevation view illustrating the assembling method for assembling the resilient pin shown in Figures 2 and 3;

Figure 8 illustrates an enlarged detail of Figure 7;

Figure 9 is a further partially cross-sectional side elevation view illustrating a fourth embodiment of the resilient pin according to the present invention;

Figure 10 is a further partial cross-sectional side elevation view illustrating a fifth embodiment of the resilient pin according to the present invention;

Figure 11 is yet a further partial cross-sectional side elevation view illustrating the use of the mentioned resilient pin, related to the embodiment being shown in Figure 9;

Figure 12 illustrates on an enlarged scale an enlarged detail of Figure 11;

Figures 13 to 16 are further partial cross-sectional side elevation views illustrating modified embodiments of the resilient pin according to the present invention;

Figure 17 is a cross-sectioned side view illustrating another modified embodiment of the subject resilient pin;

Figure 18 illustrates an extended flat view of a dished sheet metal element provided for use in making the resilient pin shown in Figure 17;

Figure 19 is a cross-sectioned side view of a further pin;

Figure 20 is a side cross-sectioned view of the pin shown in Figure 19; and

Figure 21 is a side view of a lateral portion of a damper provided for cooperating with and for anchoring to a support of a washing machine by the mentioned resilient pin, the contour thereof having an approximate sinusoidal configuration at the section C-C shown in Figure 20.

Description of the Preferred Embodiments

With reference to the number references of the accompanying drawings, the anchoring device according to the present invention comprises a resilient pin which, in its several embodiments, has been generally indicated by the reference numbers 1a, 1b, 1c, 1d and 1e, and which is provided with a cylindrical hollow body, of circular cross-section, which, on its outer side surface is provided with two shoulders 2 and 3 which are axially spaced from one

another.

The resilient pin body is moreover provided with an axial slit 4, for allowing the pin body to be resiliently radially compressed.

At least one of the two shoulders 2, 3 is coupled to the nearer axial end portion of the pin body by a conical surface portion, which defines an end portion for engaging therein said resilient pin.

The body of the resilient pin, in particular, is preferably made of a metal curved and contoured blade element, having high elastic deformability properties.

As is clearly shown in Figures 2 and 3, the resilient pin 1a is provided, in its first embodiment, with an axial slit or cut 4, substantially extending through the overall axial length of said pin 1a.

As shown, the two shoulders 2 and 3 are defined by ridges projecting from the outer side surface of the resilient pin body.

Between the two shoulders 2 and 3, the pin body has a substantially cylindrical configuration.

In this embodiment, as shown in Figures 2 and 3, the two shoulders 2 and 3 are coupled to the related axial end portions of the body of the resilient pin by two frustum of cone shaped portions 5 and 6, allowing the resilient pin 1a to be easily assembled, during the assembling operation, as it will become more apparent hereinafter.

In the embodiment shown in Figure 4, the shoulders 2 and 3 are provided by sheared or cut tooth elements 7 and 8 of the body of the pin 1b, said tooth element being outwardly bent.

In this embodiment too, the two shoulders 2

and 3 are coupled to their related axial end portions of the pin body, by two conical surface portions 9 and 10.

In the embodiment shown in Figure 5, the two shoulders 2 and 3 are also defined by ridges, which project from the outer side surface of the body of the pin 1c, as in the first embodiment, but with the difference that only the shoulder 2 is coupled to the nearer axial end portion of the body 2, by a conical surface portion 11.

In the pin embodiments shown in Figures 4 and 5, the body of the pin is also provided with a longitudinal slit 12, 13 extending substantially through the overall axial length of the pin body.

Alternately to the embodiment including a single longitudinal slit extending through the overall axial length of the pin body, it would be possible to provide several longitudinal slits, extending only for a portion of the axial length of the pin body, while allowing a radial compressibility of the pin.

As shown in Figures 6 to 8, the pin is provided to be engaged through a pair of holes 15, 16, formed in a pair of parallel ears 17 and 18, rigid with the washing machine basket 19, as well as through a hole 20 formed through an end portion of the damper 21, which is brought into alignment with the holes 15 and 16.

A resilient spacing bushing 22 is pre-engaged through said hole 20.

The engagement of the pin in the holes 15 and 16 and through the hole of the resilient spacer bushing 22 will be facilitated since at least an axial end portion of the pin is provided with a conical

configuration, as well as since the pin can be radially resiliently compressed.

The distance existing between the two shoulders 2 and 3 of the pin, in a rest condition thereof, is preferably less than the distance existing between the two outer parallel faces of the ears 15 and 16 thereby providing, as clearly shown in Figure 8, an axial load of the pin against the ears 15 and 16 so as to overcome possible clearances deriving from the working tolerances of the pieces being assembled by the mentioned pin.

In order to allow the resilient pin to be easily assembled, according to the present invention, of a lot of possible couplings of the dampers to the basket, it is possible to use the pin embodiments shown in Figures 9 to 16.

More specifically, in the pin embodiment being shown in Figure 9, the pin 1d is also provided with two shoulders 2 and 3, the shoulder 2 being defined by tooth elements 30 and being coupled to the nearer axial end portion of the pin body, through a conical surface 31.

The other shoulder 3 is defined by a reversed wave edge, in the form of the cup spring, of the other axial end portion of the pin body.

Also in this case, the distance, at a rest condition, of the shoulders 2 and 3 is less than the distance of the outer surfaces of the two ears 17 and 18.

However, owing to the specifically designed configuration of the reversed or up-turned edge 32, defining said shoulder 3, a greater resiliency of at least one of the two shoulders of the pin will be

obtained, so as to allow to recover comparatively large clearances, as is clearly shown in Figures 11 and 12.

In the embodiment being shown in Figure 10, one of the two shoulders, more specifically the shoulder 2, is defined by sheared or cut-out tooth element 33, which have their free end portions bent in the direction of the axis of the body of the pin 1e, in order to provide the shoulder 2 with a great resiliency, to provide an operation of the pin like that of the pin shown in Figure 9.

The other shoulder 3 is merely defined by a upturned edge 34 of an axial end of the pin body.

If it would be necessary to recover greater clearances, or if the distance of the two shoulders 2 and 3 is greatly larger than that provided between the two outer surfaces of the ears 17 and 18, then it would be possible to arrange between the two shoulders 2 and 3 a resiliently compressible element, adapted to be resiliently pressed along an axial direction of the pin.

The mentioned resiliently compressible element, in particular, can comprise, as shown in Figures 13 and 15, a cup-like spring 35 and 36.

As is shown in Figure 14, the above mentioned resiliently compressible element can be also constituted by a ring-like pad, of a resiliently compressible nature, as indicated at 37, or, as shown in Figure 16, it can comprise either one or more coils of a coil spring 38.

According to another modified embodiment, the pin shown in Figure 17 comprises a portion operating as a latching ring, in replacement of the above disclosed solution comprising several sheared or semi-sheared

tooth elements, or dished tooth elements.

With continuous reference to the longitudinal cross-section view of the pin being shown in Figure 17, it should be apparent that, during the winding operation, the sheet metal will be subjected to a different shrinking at the longitudinal slit thereof, with respect to the axially opposite pin portions.

In order to provide a ring as circular as possible on the plane thereof perpendicular to the longitudinal axis thereof, it is provided that the ring shown in Figure 18, as extended in a flat plane, i.e. before the winding of the pin, is provided with a partially rectilinear configuration 43.

This solution can also be adopted for the abutment ring 42.

As is clearly shown in Figures 17, 19 and 20, an approximatively sinusoidal contour anti-rotating ring 41 has ben provided.

Said anti-rotating ring 41, after engaging with the corresponding female contour 46 formed on the pin receiving bridging element, will provide a suitable anti-rotating torque.

This will prevent the contacting surfaces from being abraded and worn out.

In this connection it should be pointed out that the modified embodiment of the pin shown in Figures 17, 19 and 20 will also provide a very satisfactory preloading of the rubber pad 22, since the two ears 17 and 18 can be displaced toward one another during the latching of the damper.

Because of the axial load produced by said element 22 on the inner surfaces of the shoulders, all of the possible related rotations between the anchoring

bracket, the pin and element 22 as well as head 20 will be eliminated.

In fact, by turning for few degrees the damper 21 with respect to the axis of the pin, the element 22 will be circumferentially twisted on itself, which does not practically occurs in conventional systems.

From the above disclosure and from the observation of the figures of the accompanying drawings, it should be apparent that the invention fully achieves the intended aim and objects.

In particular, the fact is to be pointed out that an anchoring device for anchoring the basket damper in washing machines and the like has been provided, which provides a high radial load, as well as a high modulable axial load allowing to recover possible clearances due to the working tolerances of the elements to be coupled by the pin, thereby increasing the required stiffness, and reducing possible unbalancings of the swinging assembly of the washing machine.

While the invention has been disclosed and illustrated with reference to preferred embodiments thereof, it should be apparent that the invention is susceptible to many modifications and variations, which will come within the scope of the appended claims.

CLAIMS

1. An anchoring device for anchoring the damper for damping the movement of the basket in washing machines and the like, characterized in that said anchoring device comprises a resilient pin, having a circular cross-section cylindrical hollow body provided, on an outer side surface thereof, with two shoulders axially spaced from one another, said body further including at least an axial slit for allowing said body to be radially compressed and at least one of said shoulders being coupled to the nearer axial end portion of said body by a conical surface portion defining an end portion for engaging therein said body.

2. A device according to Claim 1, characterized in that said body comprises a curved and contoured metal blade element.

3. A device according to Claims 1 and 2, characterized in that at least one of said shoulders is defined by cut and bent tooth elements of said body.

4. A device according to one or more of the preceding claims, characterized in that the other of said two shoulders is also coupled to the other axial end portion of said body by a conical surface portion defining a further engaging end portion for said body.

5. A device according to one or more of the preceding claims, characterized in that said shoulder opposite to said shoulder coupled to the axial end portion of said body is defined by a upturned edge of said other axial end portion.

6. A device according to one or more of the preceding claims, characterized in that said shoulder opposite to said shoulder coupled to said axial end portion of said body is defined by a upturned edge, of

wave configuration, said upturned edge being resiliently flexible due to a variation of the distance of said two shoulders.

7. A device according to one or more of the preceding claims, characterized in that said cut and bent tooth element are resiliently flexible due to a variation of the distance of said two shoulders.

8. A device according to one or more of the preceding claims, characterized in that at least one of said two shoulders is defined by a ridge projecting from the side surface of said body.

9. A device according to one or more of the preceding claims, characterized in that said axial slit extends through the overall axial extension of said body.

10. A device according to one or more of the preceding claims, characterized in that said body is provided with a plurality of axial slits, extending through a portion of the side surface of said body.

11. A device according to one or more of the preceding claims, characterized in that the distance of said two shoulder is, at a rest condition, less than the distance of the two fixing ears, said pin is designed to pass therethrough.

12. A device according to one or more of the preceding claims, characterized in that the distance between said two shoulders is greater, at a rest condition, then that of the two fixing ears to be traversed by said pin, and that between said two shoulders a resiliently axially deformable element fitted on said body is engaged.

13. A device according to one or more of the preceding claims, characterized in that said resilient

element comprises a cup spring.

14. A device according to one or more of the preceding claims, characterized in that said resilient element comprises a ring-like resilient pad.

15. A device according to one or more of the preceding claims, characterized in that said resilient element comprises a coil spring.

16. A device according to one or more of the preceding claims, characterized in that said device further comprises a latching ring having a contoured projecting profile.

17. A device according to one or more of the preceding claims, characterized in that said pin is made of a sheet metal material the flat configuration of which has, before the winding of the pin, a partially rectilinear configuration at a portion of said pin at said latching ring and/or abutment ring.

18. A device according to one or more of the preceding claims, characterized in that said pin comprises an anti-rotary ring-like element having a side section of an approximatively sinusoidal profile.

19. A device according to one or more of the preceding claims, characterized in that said approximatively sinusoidal profile of said pin is provided for engagement with a like female profile formed in the holes of the bridging element receiving said pin, by providing a rotary resistant torque while protecting the contacting surfaces from abrading.

20. A device according to one or more of the preceding claims, characterized in that said pin allows a rubber element or pad to be optimally preloaded since, as said damper is affixed, said two ears can be easily moved toward one another.

21. A device according to one or more of the preceding claims, characterized in that said pad provides an axial load on the inner surfaces of said shoulders, thereby preventing possible mutual rotations of the anchoring bracket, pin, pad and a head element, since by turning through few degrees said damper with respect to the axis of said pin, said pad is circumferentially twisted on itself.

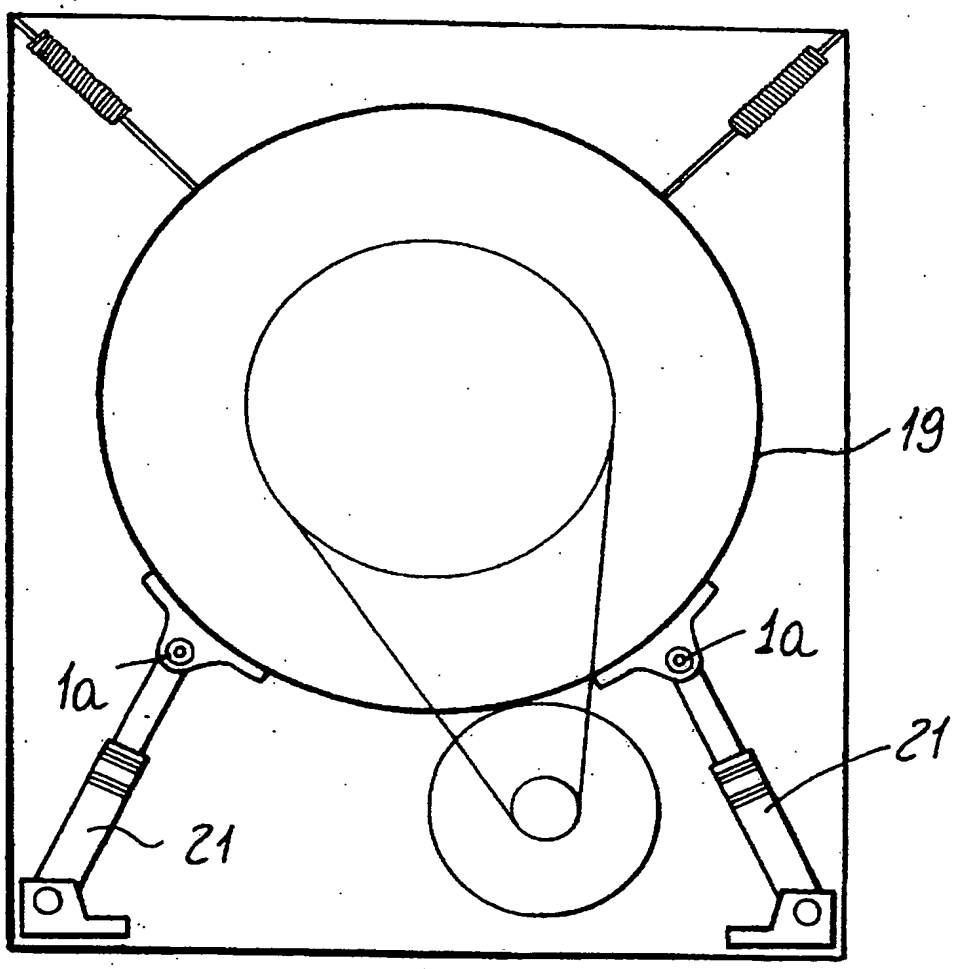

FIG. 1

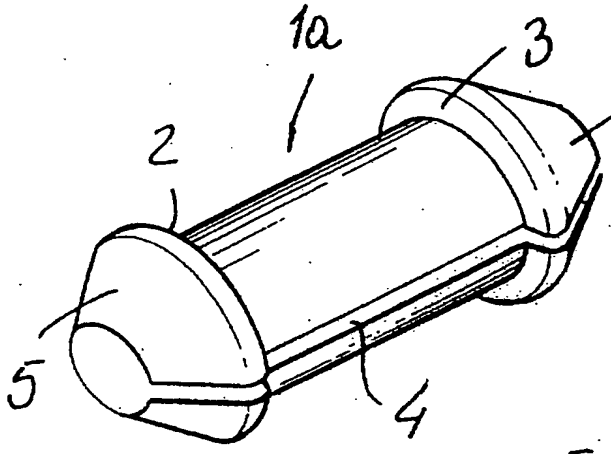

FIG. 2

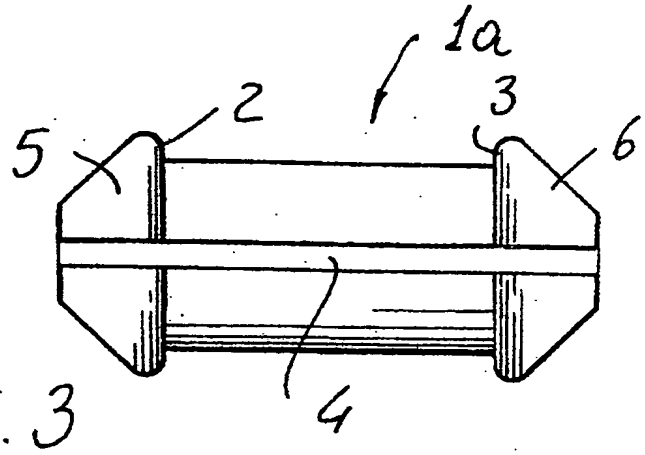

FIG. 3

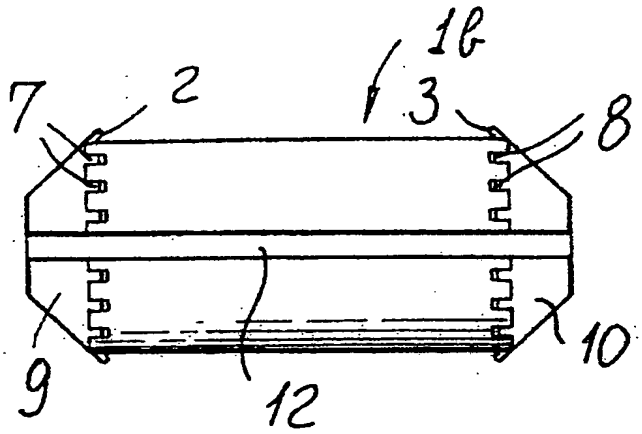

FIG. 4

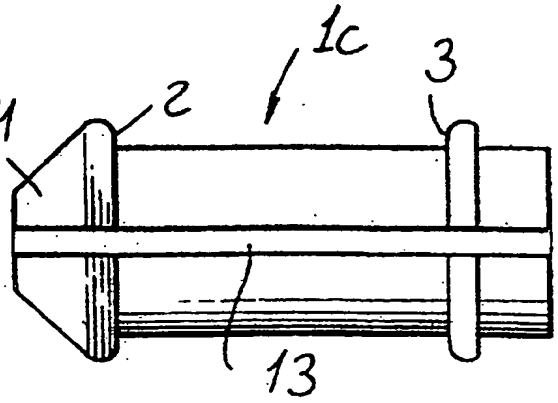

FIG. 5

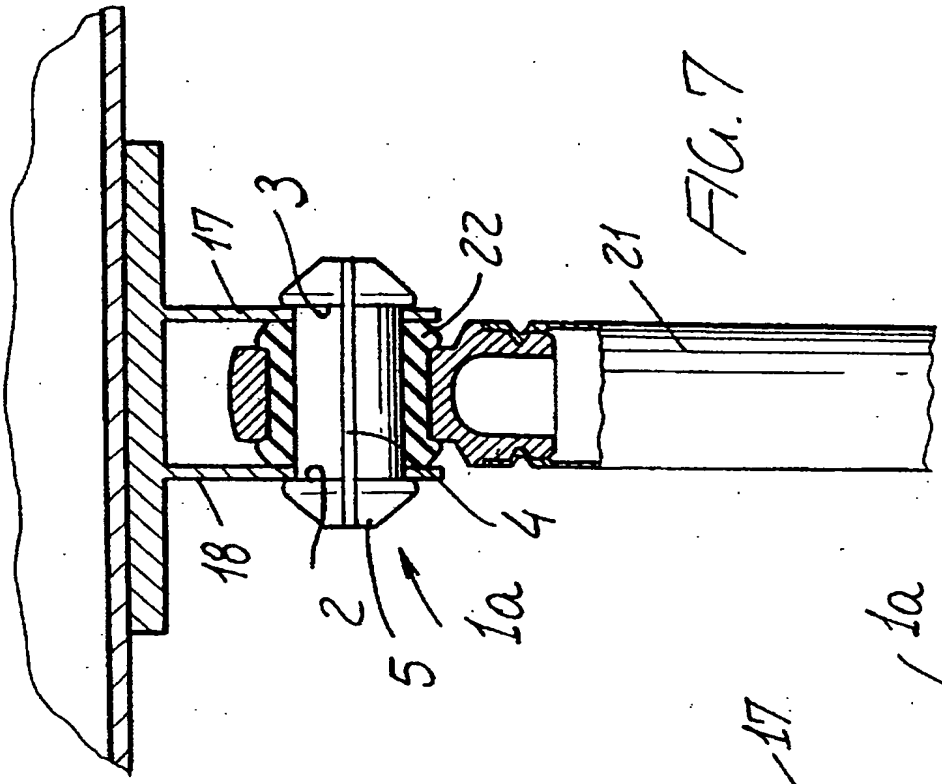

FIG. 7

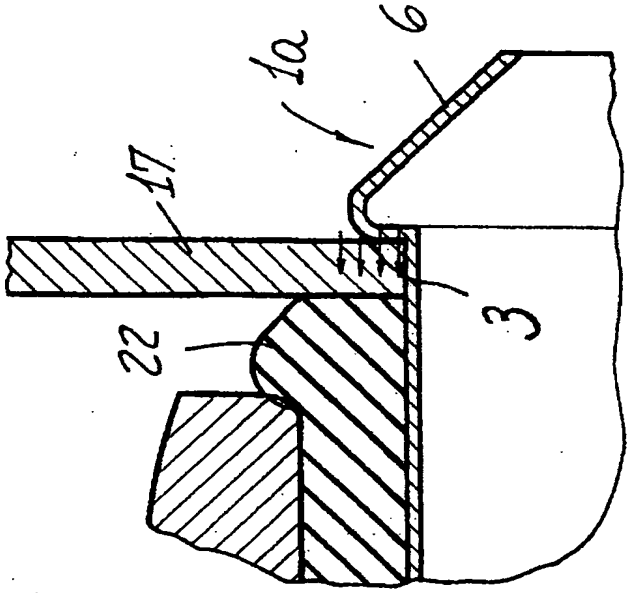

FIG. 8

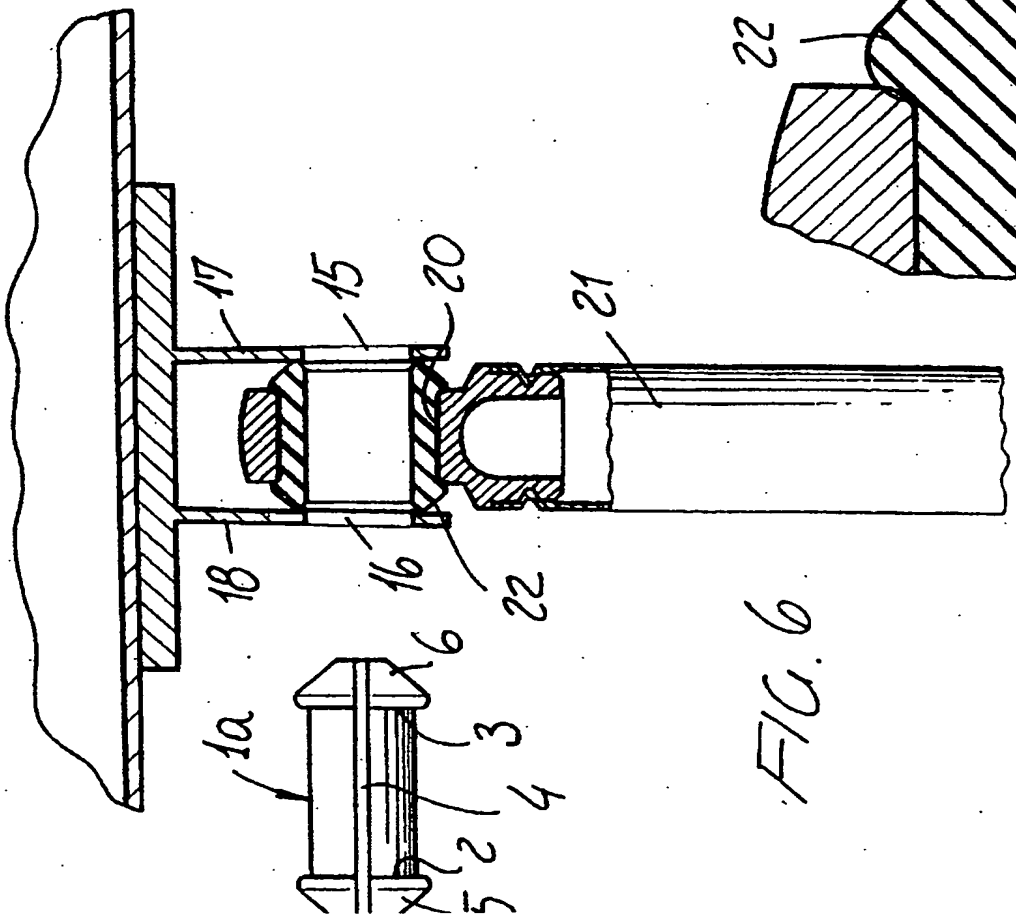

FIG. 6

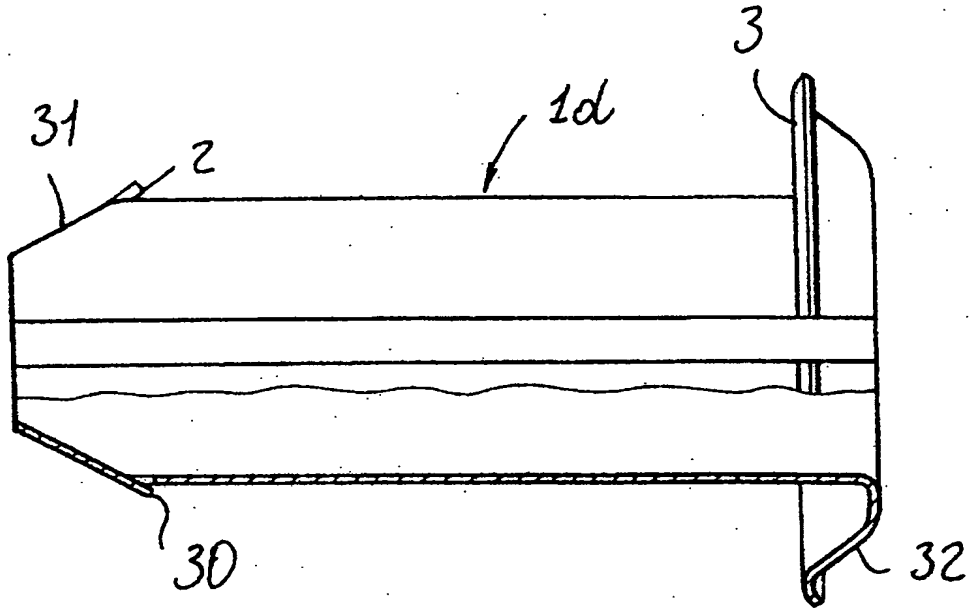

FIG. 9

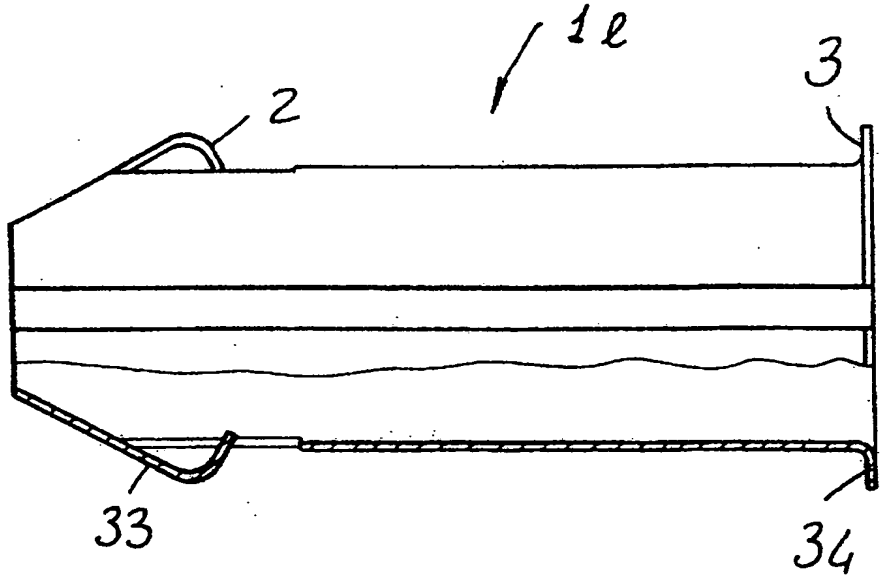

FIG. 10

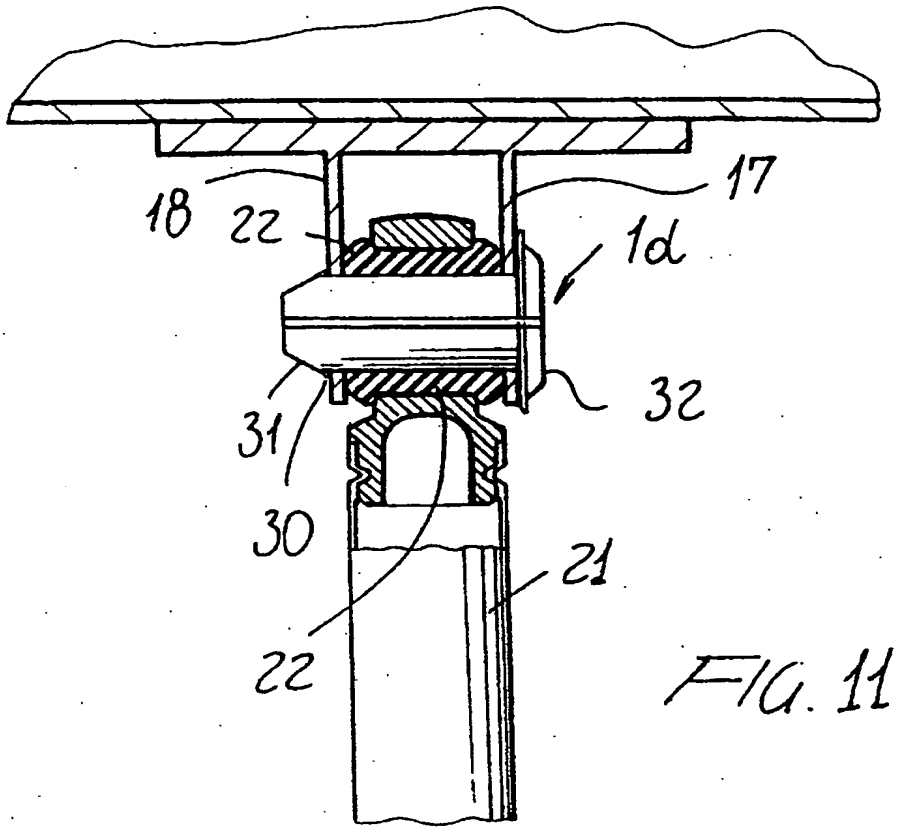

FIG. 11

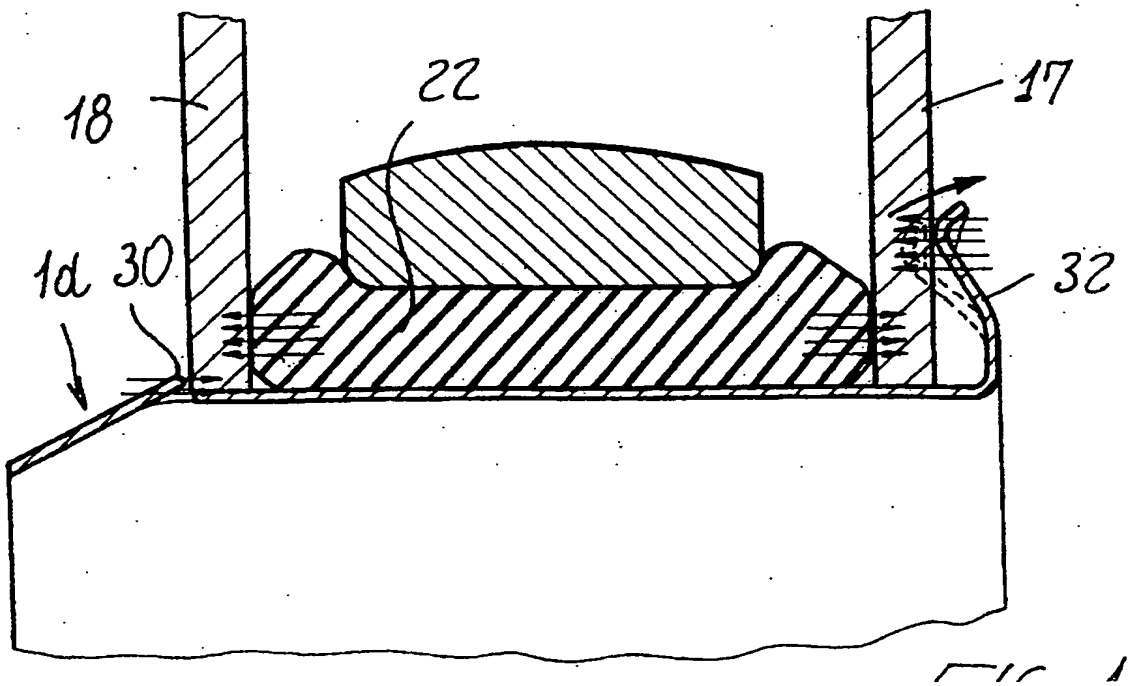

FIG. 12

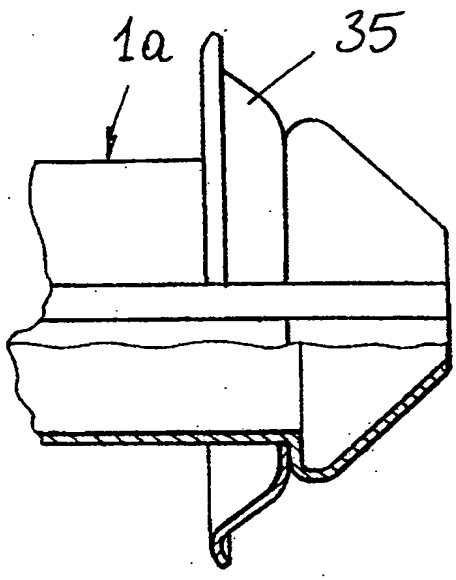

FIG. 13

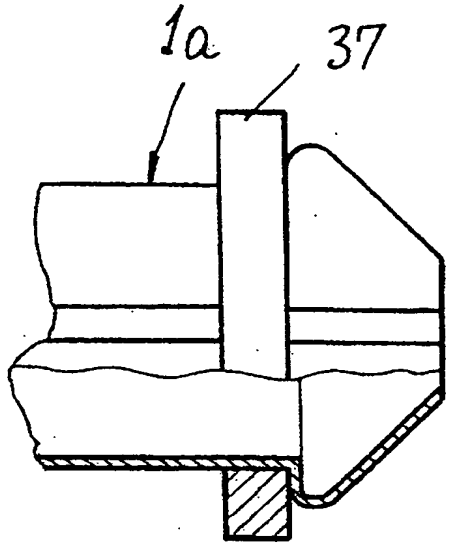

FIG. 14

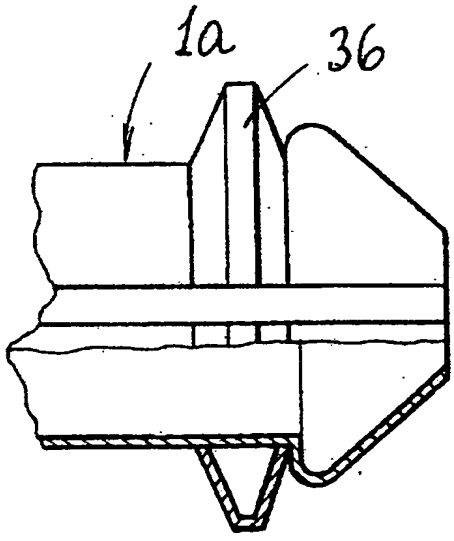

FIG. 15

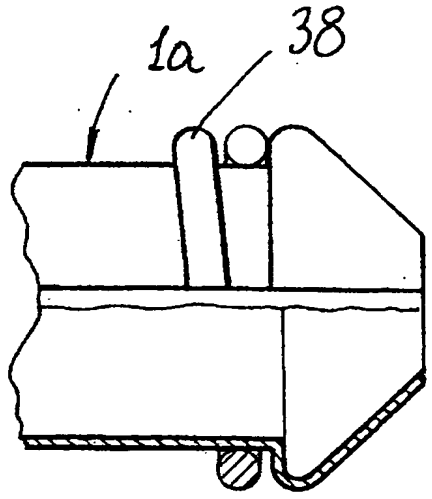

FIG. 16

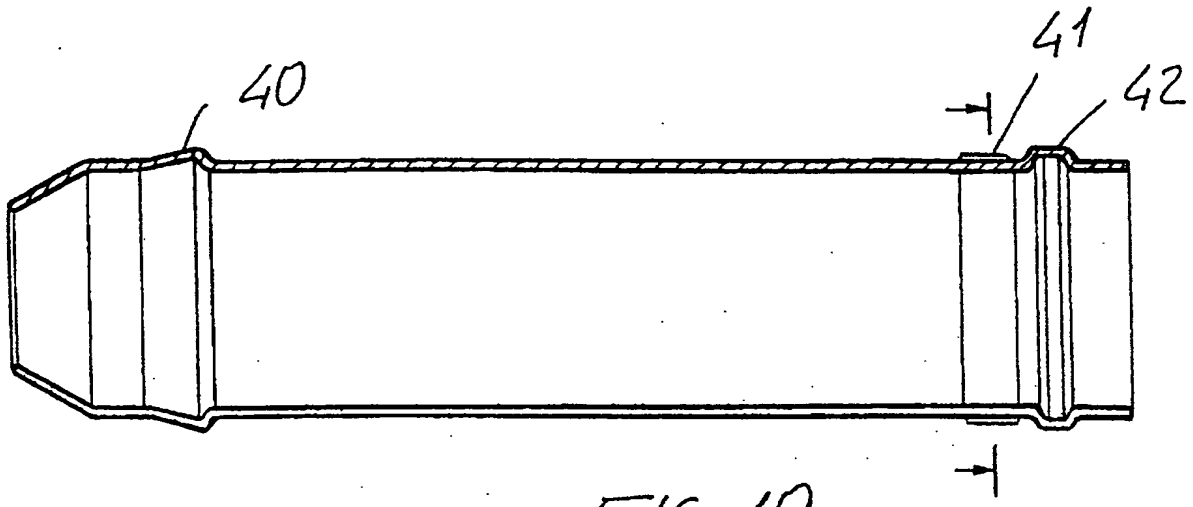

FIG. 19

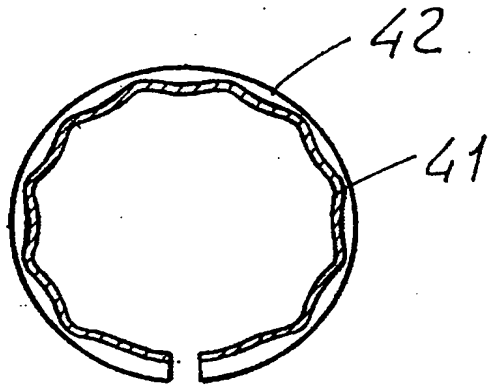

FIG. 20

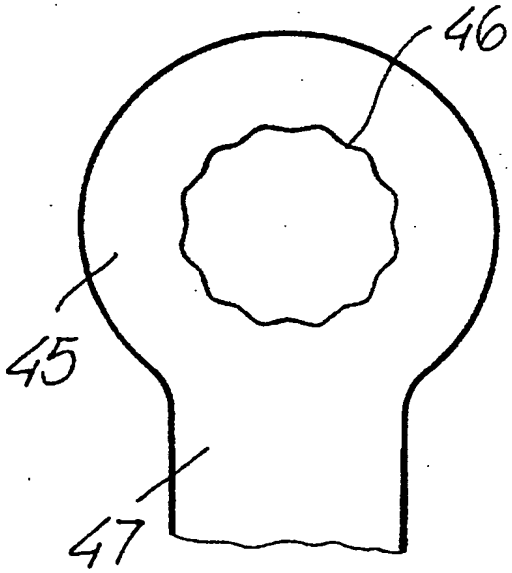

FIG. 21

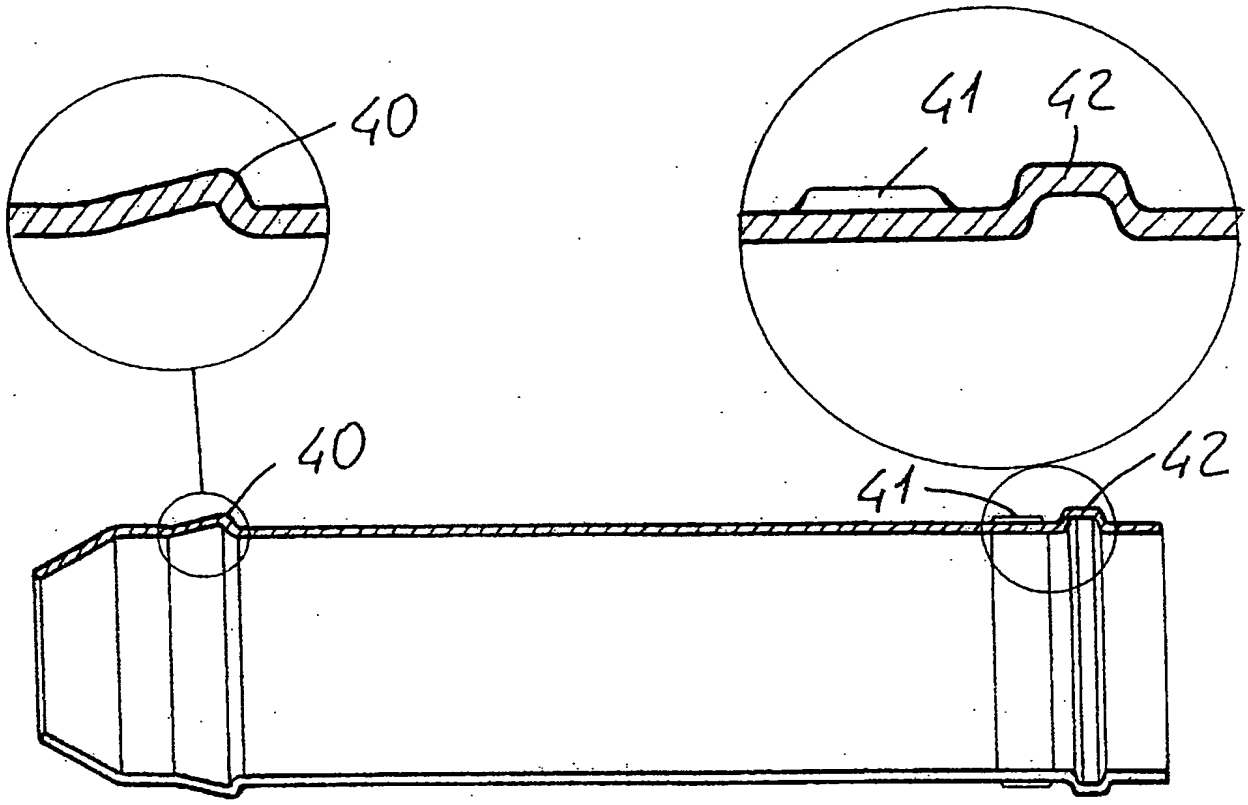

FIG. 17

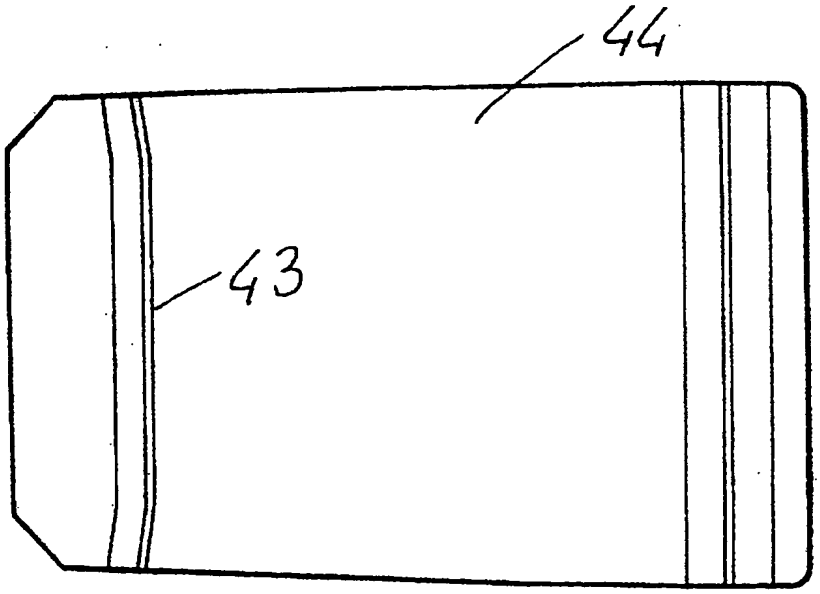

FIG. 18

INTERNATIONAL SEARCH REPORT

Interna J Application No
PCT/IT 97/00307

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 F16F9/54

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 D06F F16F F16B B60G F16C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	PATENT ABSTRACTS OF JAPAN vol. 003, no. 080 (M-065), 11 July 1979 & JP 54 057076 A (KAYABA IND CO LTD), 8 May 1979, see abstract	1-10,12, 14,16,17
A	---	11
Y	US 1 344 596 A (F. SCHAEFER) 22 June 1920 see figures	1,2,5,6, 8,10,16, 17

Y	DE 19 29 057 A (ED. SCHARWÄCHTER) 23 December 1970 see page 6, paragraph 3 - page 7, paragraph 1; figures 1-3	4,9,12, 14

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
25 March 1998	09.04.98

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Pöll, A

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PCT/IT 97/00307

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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